



## Scottish national bronchoscopy audit: a prospective multicentre study of 3316 cases against agreed standards

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**Introduction:** Bronchoscopy guidelines address issues of patient and operator safety but do not give guidance on the expected yield of the procedure. Realistic standards for several outcome measures of bronchoscopy for investigating bronchial carcinoma have been derived by Scottish clinicians from a published national study. The present study describes the use of these agreed standards in prospective audit.

**Methods:** All Society members in Scotland (population 5.1million) were invited to participate. Data were collected for 1 year and coded anonymously.

**Standards:** 1. Supervising bronchoscopist to have completed at least 100 procedures; 2. histology to be positive in 80% of cases where tumour seen; 3. 35%–55% of bronchoscopies to reveal a diagnosis; 4. 60% of patients admitted for bronchoscopy to be day cases; 5. 80% of day case patients to be in hospital for less than 6 h; 6. 90% of male patients and 80% of female patients willing to have repeat bronchoscopy.

**Results:** Three thousand, three hundred and sixteen bronchoscopies were performed by 45 senior pulmonologists at 22 centres. One centre reached all the standards and five centres met five standards. There was wide national variation in histological spectrum, incidence of small cell cancer ranged from 12% to 25% between centres. Participants found their own data helpful in identifying local areas for improvement.

**Conclusion:** Bronchoscopy standards set locally by practising pulmonologists can be used in collaborative audit to identify areas for improving practice. Variation in histology may be accounted for by case-mix or pathology techniques.

**Key words:** bronchoscopy; audit; lung cancer; histology.

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### Introduction

Fibreoptic bronchoscopy is widely used for investigation of suspected bronchial carcinoma. Both the British Thoracic Society (BTS) and American Thoracic Society (ATS) have published guidelines on the use of bronchoscopy and recommendations on training (1–3). The BTS guidelines are concerned primarily with good practice for patient and staff safety while the ATS guidelines suggest broad applications and contraindications for the procedure. The prime aim of fibreoptic bronchoscopy for bronchial carcinoma is histocytological confirmation but neither of these guidelines suggests targets for outcomes.

There is known to be wide variation in clinical practice among hospitals in the U.K. (4) and North America (5) but it is not known how this might affect final histocytological yield. Outcome issues have been investigated in several studies. Histocytological yield may be dependent on the technique used, the number of specimens taken (6–8), and may vary between bronchoscopists (9).

Members of the Scottish Thoracic Society (STS) wished to examine their performance in bronchoscopy both in practical aspects of the procedure and also in rates of histocytological yield. In the absence of national or international standards on outcomes of bronchoscopy a previous prospective study had provided realistic standards by consensus of participating clinicians (10). Respiratory consultants throughout Scotland were then invited to participate in a prospective audit using these standards. The present study describes the use of nationally agreed audit standards in fibreoptic bronchoscopy to help clinicians identify areas of excellence and possible deficiency in their practice.

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## Methods

Audit standards were derived from a previous multicentre prospective study of 1802 bronchoscopies for bronchial carcinoma which revealed variation in practice, patient satisfaction and histocytological results (10). Standards were agreed at a conference attended by most consultant members of the STS and refined by a Steering Group formed to encourage bronchoscopy centres in Scotland to participate in collaborative audit. The steering group was composed of nine clinicians and one pathologist from nine centres and represented both university and peripheral hospitals. These standards were considered by the Group to be realistic targets which represented good practice in several important aspects of fiberoptic bronchoscopy. All senior members of the STS were invited to participate in a nationwide audit of bronchoscopy practice using the agreed standards.

### BRONCHOSCOPY AUDIT STANDARDS

1. Doctors performing fiberoptic bronchoscopy to have completed at least 100 previous procedures under supervision.
2. Where tumour is seen bronchoscopically, aim to achieve histocytological confirmation in 80%.
3. Between 35–55% of diagnostic bronchoscopies to confirm bronchial carcinoma should reveal either macroscopic abnormality or positive cytology.
4. For patients living within 10 miles of the hospital bronchoscopy should be performed as a day case in 60% (unless the practice of the hospital is to admit for a complete prospective workup).
5. Aim for 80% of day case patients to be in hospital for less than 6 h.
6. More than 90% of male patients should be willing to have repeat bronchoscopy.
7. More than 80% of female patients should be willing to have repeat bronchoscopy.

The audit was confined to bronchoscopies performed principally for the diagnosis of suspected bronchial carcinoma between May 1995 and May 1996. Preprinted audit forms were completed by medical and nursing staff at the time of bronchoscopy and histocytological results were added when available. Patient satisfaction questionnaires were completed by the patient between 12 and 48 h after the procedure and either posted or hand-delivered at the next clinic visit. The data were collected and processed by the Audit Office of the Royal College of Physicians and Surgeons of Glasgow (RCPSG). Results were anonymized but each participating hospital and physician had access to their own code.

## Results

Forty-five consultant respiratory physicians from 22 centres participated in the audit representing about 80% of bronchoscopic activity in Scotland, population 5 128 000

(11). Data forms were returned for 3316 bronchoscopies. Returns for individual centres are shown in Table 1. One centre (B) did not return any forms.

### GRADE OF STAFF PERFORMING BRONCHOSCOPY

All bronchoscopies were performed or supervised by doctors who had performed at least 100 bronchoscopies under supervision.

### HISTOCYTOLOGICAL YIELD

Figure 1 shows the percentage of histologically proven bronchial carcinomas where tumour was visualized. Only centres where more than 25 tumours were seen are illustrated.

Figure 2 shows the histological spectrum for each hospital where more than 20 cancers were diagnosed.

### PROPORTION OF ABNORMAL BRONCHOSCOPIES

Figure 3 shows the proportion of bronchoscopies which revealed a diagnosis of bronchial carcinoma. Centres which performed less than 50 procedures are excluded.

### LOCAL DAYS CASES

Figure 4 shows percentage of local patients treated as day patients. One centre did no day case bronchoscopy.

### TIME IN HOSPITAL

Twelve centres discharged more than 80% of day cases in less than 6 h. In two centres less than 20% of day cases were

TABLE 1. Number of forms returned from participating centres

Hospital		Hospital	
Code	<i>n</i>	Code	<i>n</i>
A	175	O	40
B	0	P	356
C	240	Q	76
D	14	R	120
E	119	S	50
F	147	T	180
G	35	V	422
I	83	W	277
K	184	X	225
L	90	Y	174
M	81	Z	228

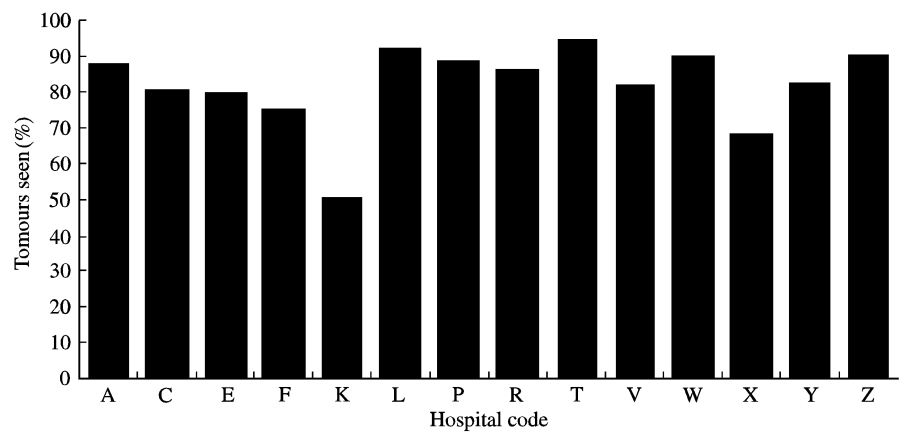


FIG 1. Percentage of visible tumours confirmed histologically.

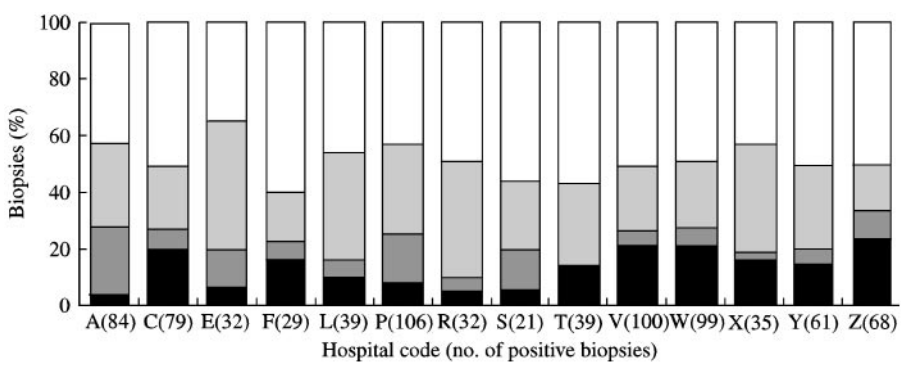


FIG 2. Histological spectrum of positive biopsy specimens. ■: undifferentiated; ■: adenocarcinoma; ■: oat/small cell; □: squamous.



FIG 3. Percentage of all bronchoscopies which reveal a diagnosis of cancer.

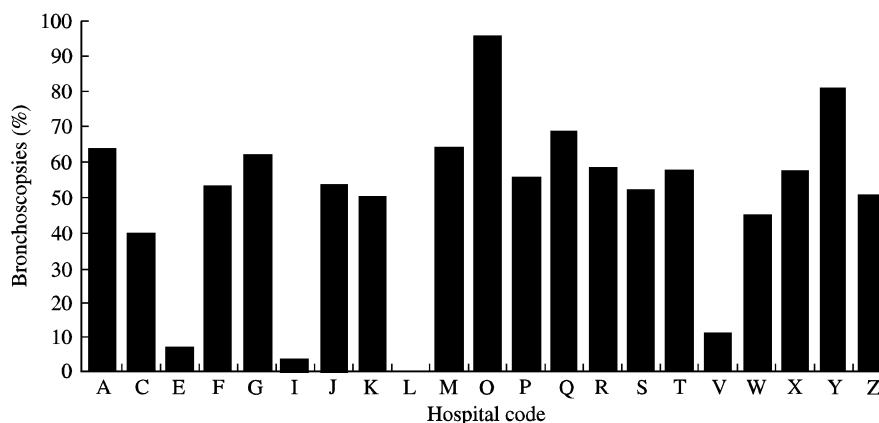


FIG 4. Percentage of bronchoscopies as day cases.

discharged within 6 h. The mean hospital stay for day case patients ranged from 3 to 8 h between centres.

## PATIENT SATISFACTION

Two centres did not achieve the standard for both male and female patients and eight centres did not achieve the standard for females alone.

## OVERALL PERFORMANCE

One centre achieved all seven standards and five achieved six standards.

Anonymized data were made available to all participants and presented for discussion at a national meeting. Participants found the standards of value in comparing their activity against other centres.

## Discussion

### GRADE OF STAFF PERFORMING BRONCHOSCOPY

The figure of 100 bronchoscopies was chosen as representing approximately 1 year of regular bronchoscopy practice for a trainee in Respiratory Medicine, following which the doctor would be considered competent in most aspects of routine fiberoptic bronchoscopy. This compares with a large North American survey (5) in which 60% of respondents suggested that trainees need to have performed more than 50 bronchoscopies to become competent. All participating centres met the standard, suggesting high levels of supervision and experience in bronchoscopy.

### HISTOCYTOLOGICAL YIELD IN VISIBLE TUMOUR

Three centres were unable to meet this target and one (K) was well below. Yield from bronchoscopy may vary with tumour position and operator experience (9) or be due to

differences in pathology processing and reporting; centres with lower yields are required to address the reasons. Some variation in histological spectrum between hospitals is to be expected and could be due to case mix or differences in reporting. The variation in rates of small cell carcinoma (SCC) is particularly important as these tumours are usually chemosensitive and many patients with SCC are included in national trials.

### PROPORTION OF ABNORMAL BRONCHOSCOPIES

The risk and inconvenience of a procedure is balanced against the likelihood of a positive or negative finding. A very high proportion of abnormal bronchoscopies may suggest under-investigation while a very low proportion may suggest over-investigation. There was initial difficulty in agreeing this standard and the large variation shown suggests that it may not be realistic to set a target. Factors such as individual clinician's threshold of suspicion, patient concern and available resources may have too large an influence to allow a standard to be set.

### LOCAL DAY CASES

Patients may be unable to attend as day cases due to concurrent illness, geographical or social factors. However a previous Scottish study suggested that 60% of patients living within a 10 mile radius should be able to go home the same day (10). In some centres, especially those serving a wide geographical area, patients attend for a complete assessment including consultation, chest radiograph, bronchoscopy and CT scan in a single visit which may require an overnight stay.

### TIME IN HOSPITAL

Some patients will require longer stays than others due to a variety of factors including transport, general fitness and availability of friends and relatives to supervise discharge.

We suggest that our proposed standard is a realistic target for most patients.

## PATIENT SATISFACTION

Reasons for variations in satisfaction are unknown and do not appear to be related to the sedation technique used nor to grade of staff performing bronchoscopy (10). There may be elements in the hospital procedures or infrastructure which affect patients overall perception of the investigation and these may lie outwith the clinician's control. Centres with low satisfaction scores may need to ask patients more detailed questions about all aspects of their admission.

## Conclusion

Current guidelines on bronchoscopy are consensus documents from national societies relating to training, indications for the procedure and good procedural practice (1–3). They do not address clinical outcome, possibly because of the difficulty in reaching agreement over what constitutes reasonable results. There can be resistance among clinicians to accept the validity of guidelines in clinical practice (12,13). Instead of suggesting further protocols or guidelines we have described how physicians can use realistic procedural and outcome standards, derived from their own population, to identify areas of excellence and areas for possible improvement in practice. The study was only possible due to the sense of ownership engendered by involving all participants in discussing and setting standards, and we suggest that this may be more difficult in larger groups of clinicians or over a wider geographical area. The authors are not aware of any other published studies of bronchoscopy comparing outcome results against peer-approved standards and suggest that the technique may be applicable to other procedures.

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